

Town of Stonington Coastal Resilience Plan

July 2017



Coastal Flooding in Stonington

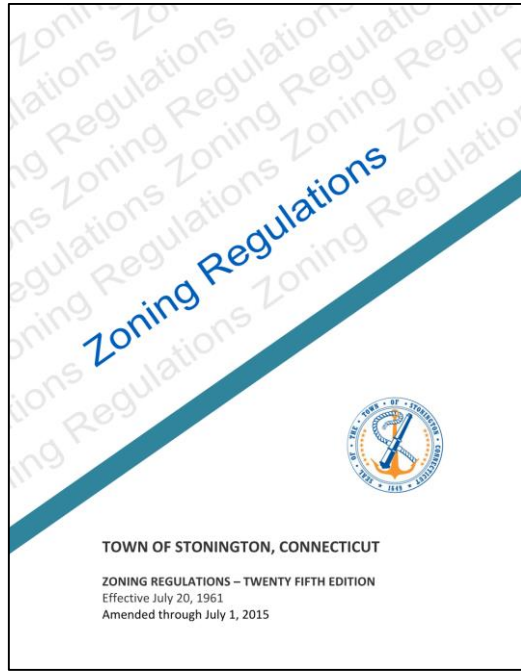
- Since 1978, Stonington residents have received over **\$4.5 million in flood insurance payouts**
- Global mean sea levels have risen by **8-9 inches since 1880** (rate of 0.06-0.07 inches annually)
- In the Northeast, sea levels have risen approximately **1 foot over the last century** (50% faster than the global average)
- Major flood events occurred July 2009 & March 2010
- Superstorm Sandy caused significant damage to the Town Dock and Mason's Island Causeway
- 4057 properties currently at-risk (**worth \$1.8 billion***)
- 4246 properties at-risk by 2050 (**worth \$2 billion***)



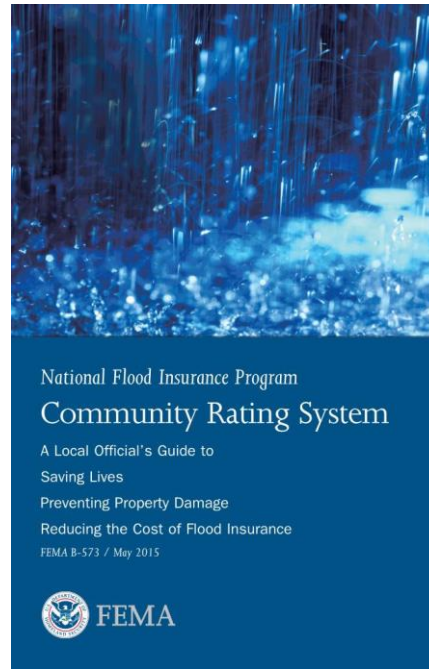
Source: The Westerly Sun

*Values taken from the 2016 Stonington Assessor's Database

Stonington's Current Flood Protection Actions



Restrict development in the 100-year floodplain and require elevation of new construction above base flood elevation



Past participation in the Community Rating System



Construction, maintenance, and improvements to flood control structures.



Goals for the Coastal Resilience Plan



Identify Stonington's vulnerability



Educate the community on the coastal flood risks



Develop resilience solutions and next steps

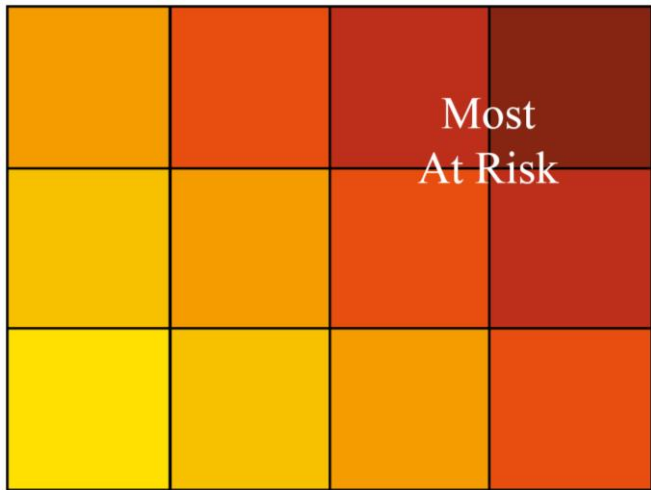
Overview of Approach

Step 1



Establishing a climate baseline

Step 2



Ranking risk

Step 3



Developing solutions

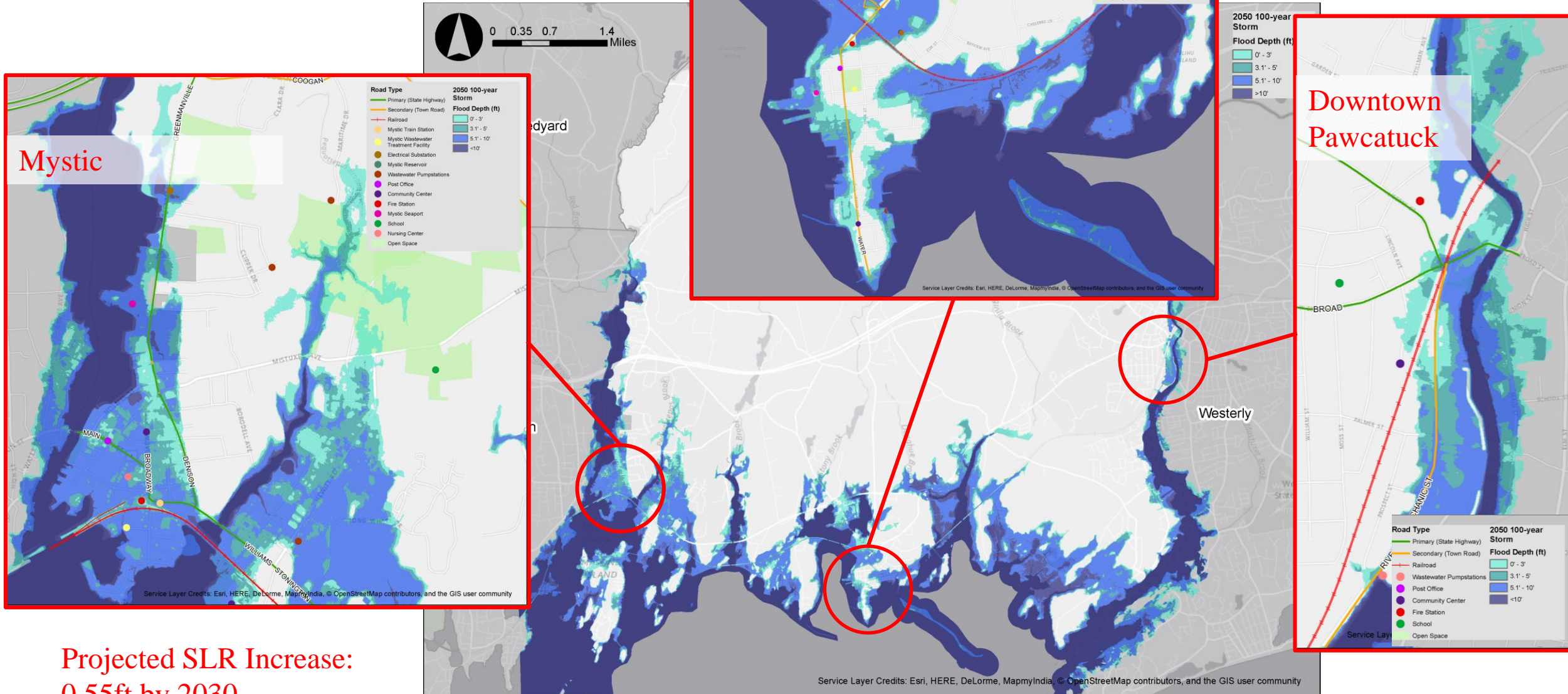
2015

2030

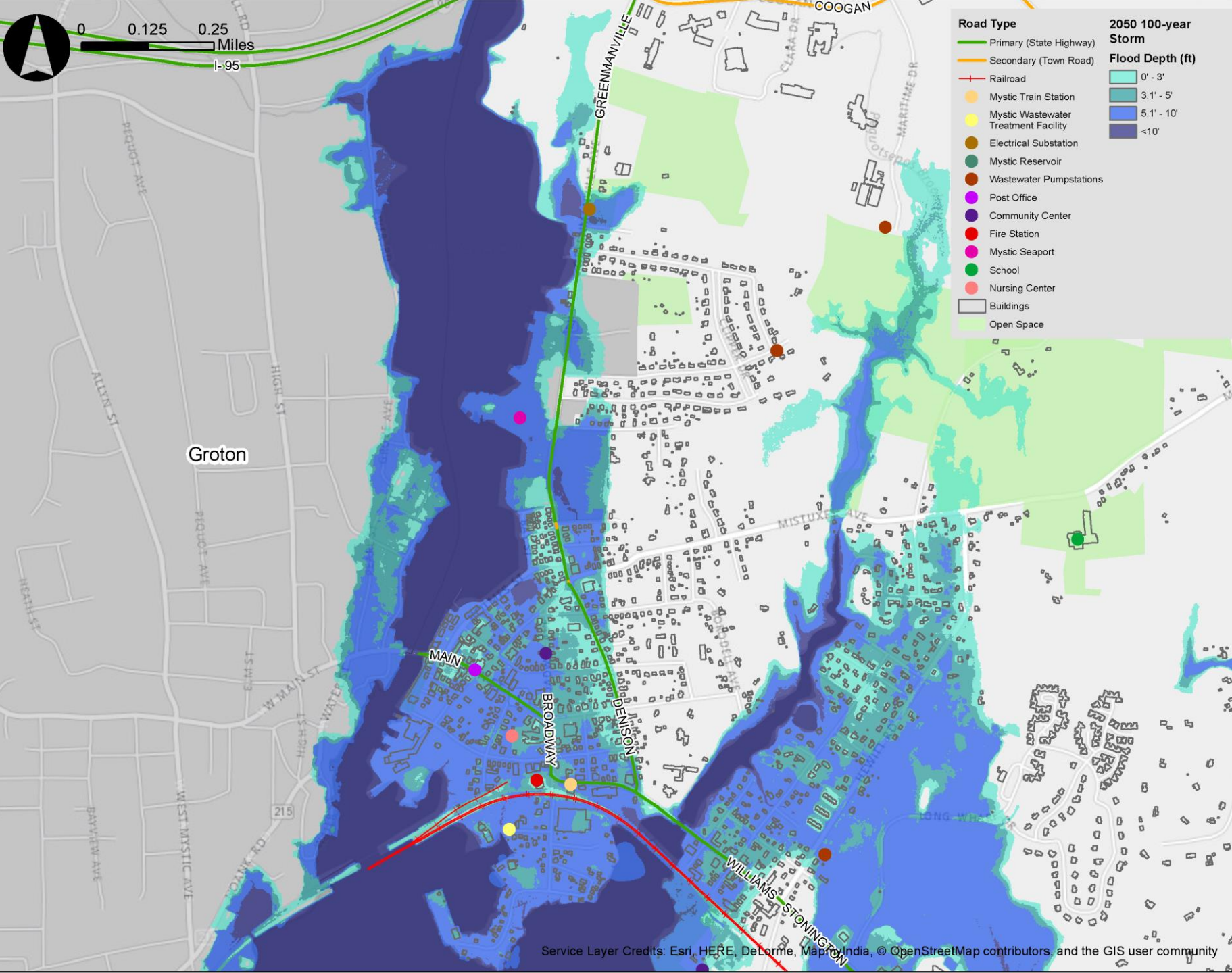
2050



Step 1: Climate Baseline



Projected SLR Increase:
0.55ft by 2030
1.69ft by 2050



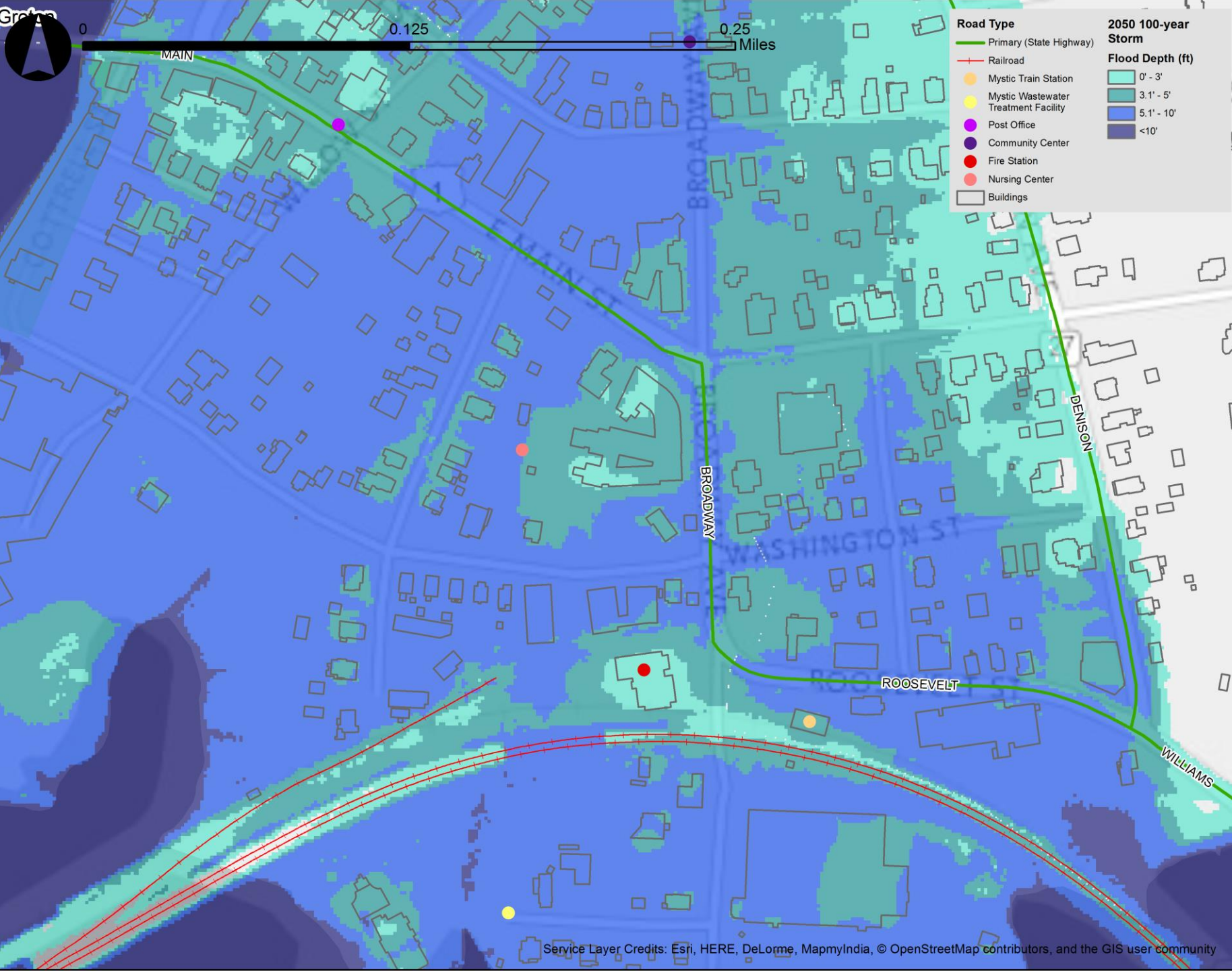
Village of Mystic



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experts in place



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Downtown Mystic



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Service Layer Credits: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Step 2: Risk Assessment

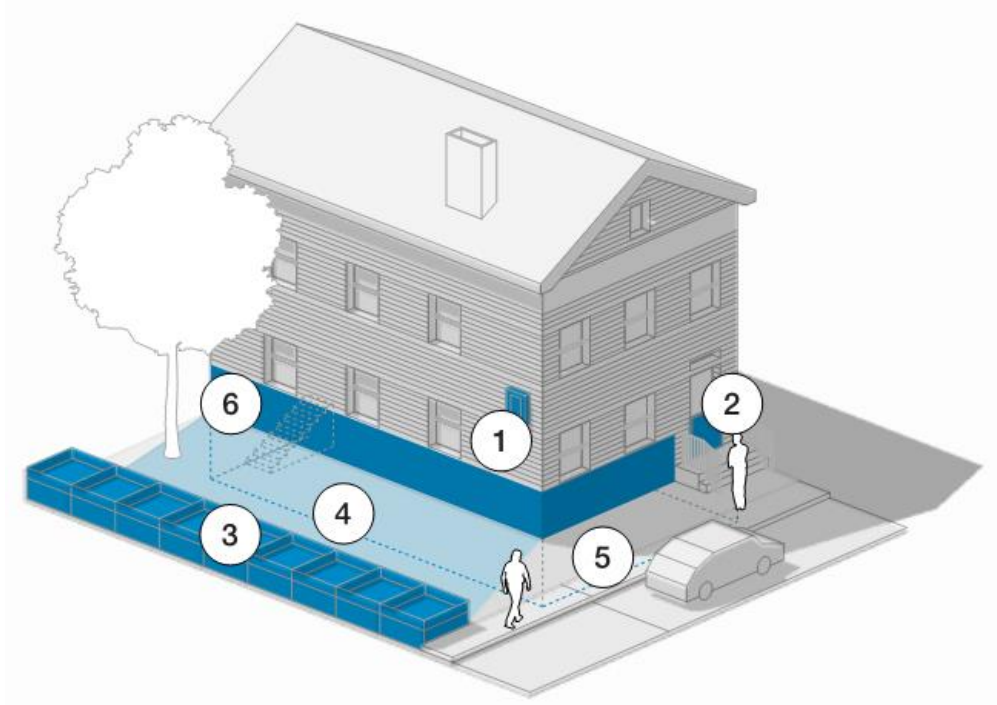
Risk = Hazard x Exposure x Vulnerability

- **Hazard** = Storm Event (i.e. Present-day 100-year storm, 100-year storm in 2030, 1000-year storm in 2050)
- **Exposure** = Depth of Flooding
- **Vulnerability** = An Assessment of:
 - Impact on community
 - Critical Facilities
 - Replacement Cost
 - Economic impact to tourism (including historic resources)

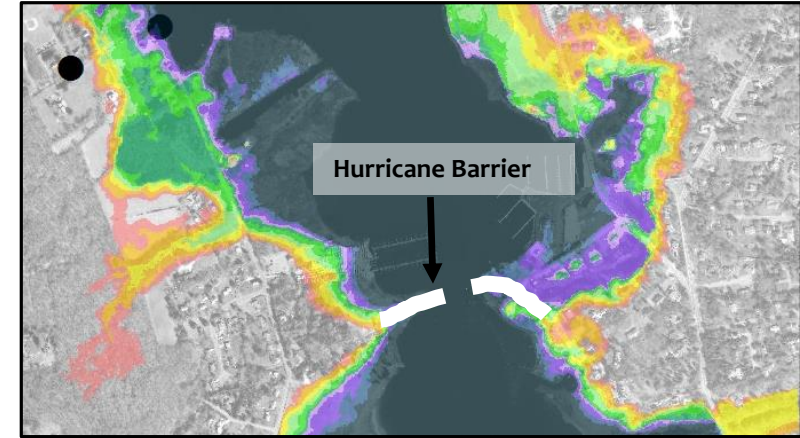
25 Highest Risk Assets

Masons Island Causeway	Mystic Bridge Historic District	State Highway 1
Mystic Wastewater Treatment Facility	Rossie Velvet Mill Historic District	Cutler St. Electrical Substation
Boulder Avenue Pump Station	Stonington Borough Historic District	Mystic Train Station & Rail Line
River Road/Mary Hall Road Pump Station	Apple Rehab Mystic	Barn Island Management Area
Stonington Wastewater Treatment Facility	Mystic Seaport	Stonington Community Center (COMO)
Town Dock	Greenmanville Ave Electrical Substation	Mystic River Park, Cottrell Street
Mystic Fire Dept.	State Highway 27	Lords Point neighborhood
Quiambug Fire Dept.	Donahue Park	Murphy's Point neighborhood
Mechanic Street Historic District		

Step 3: Resilience Solutions

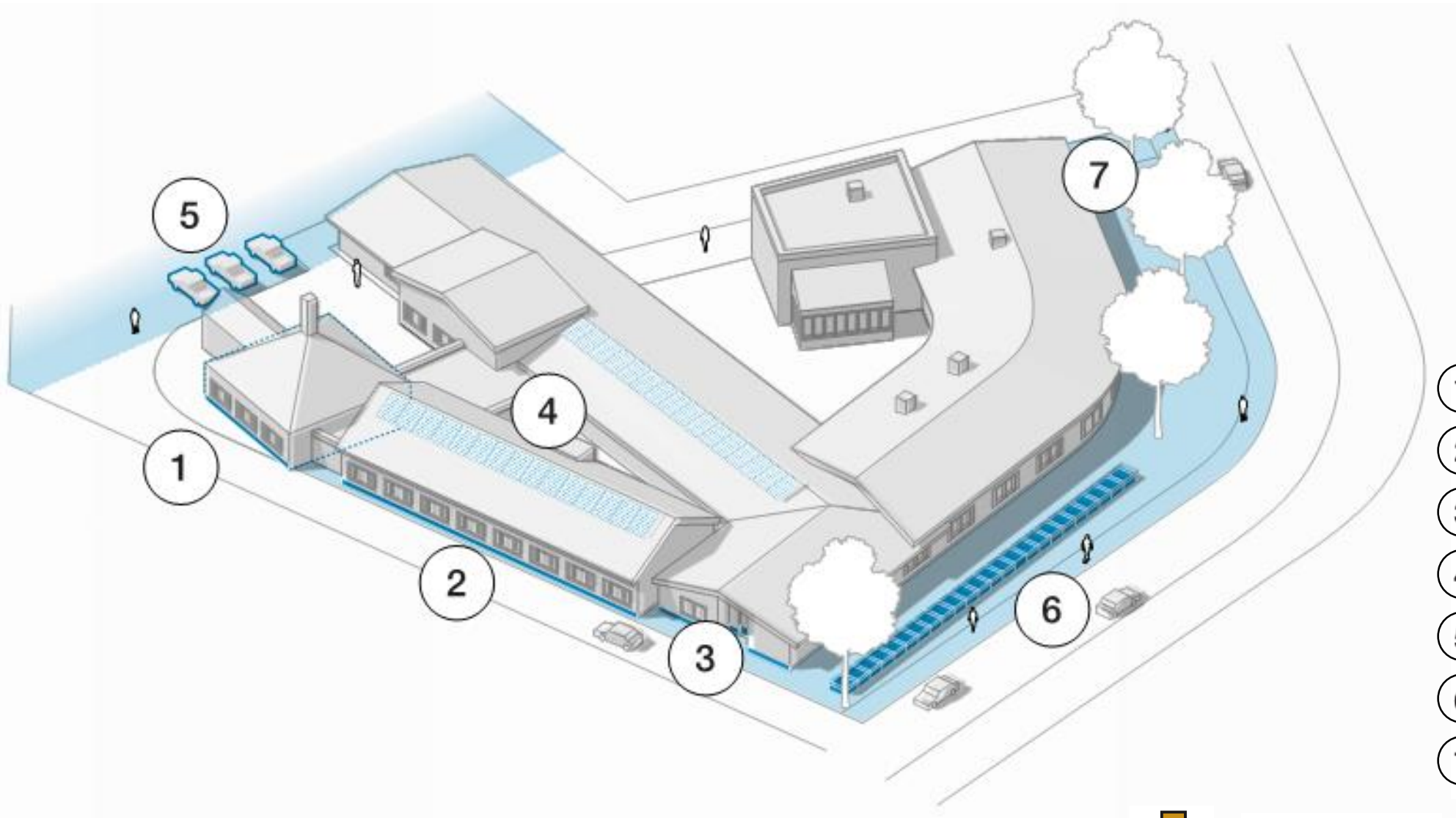


Asset Solutions



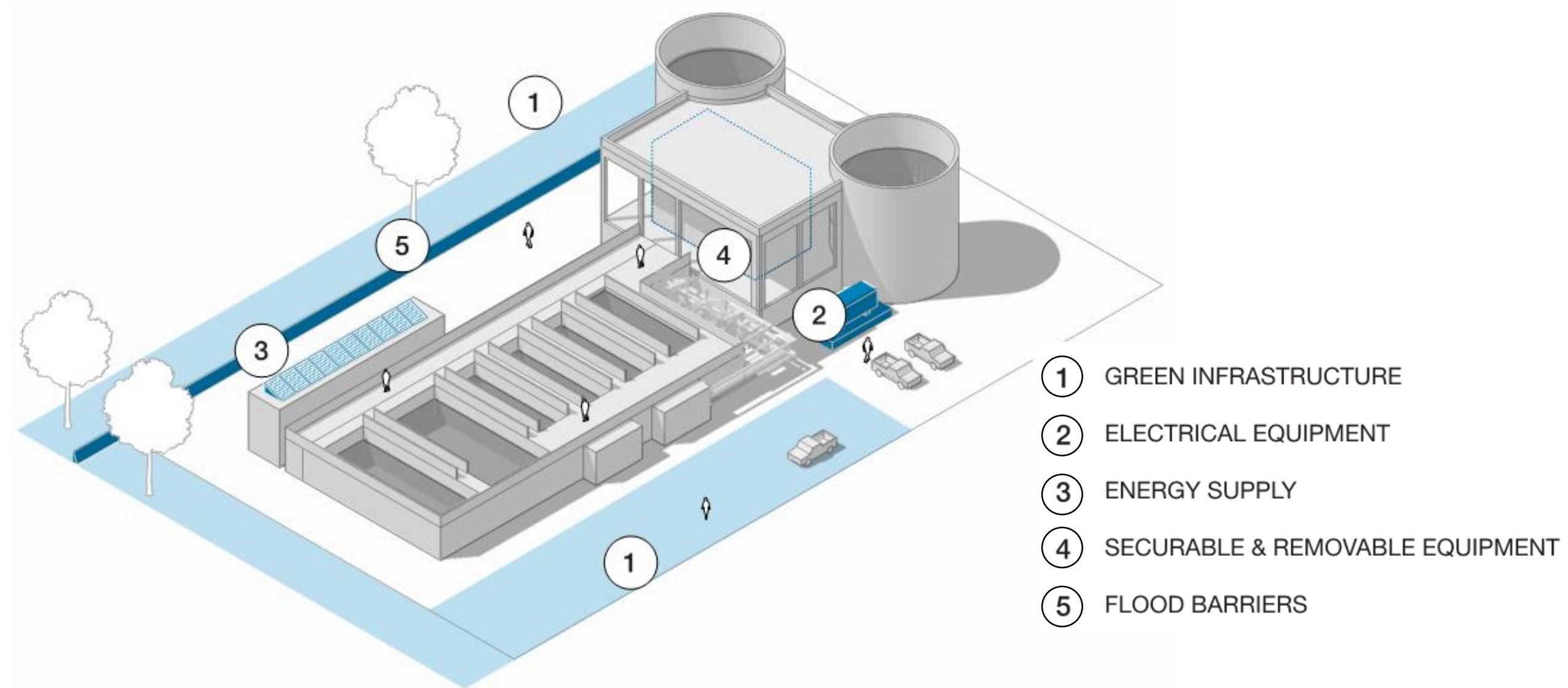
Regional Solutions

Solution #1: Apple Rehab Mystic

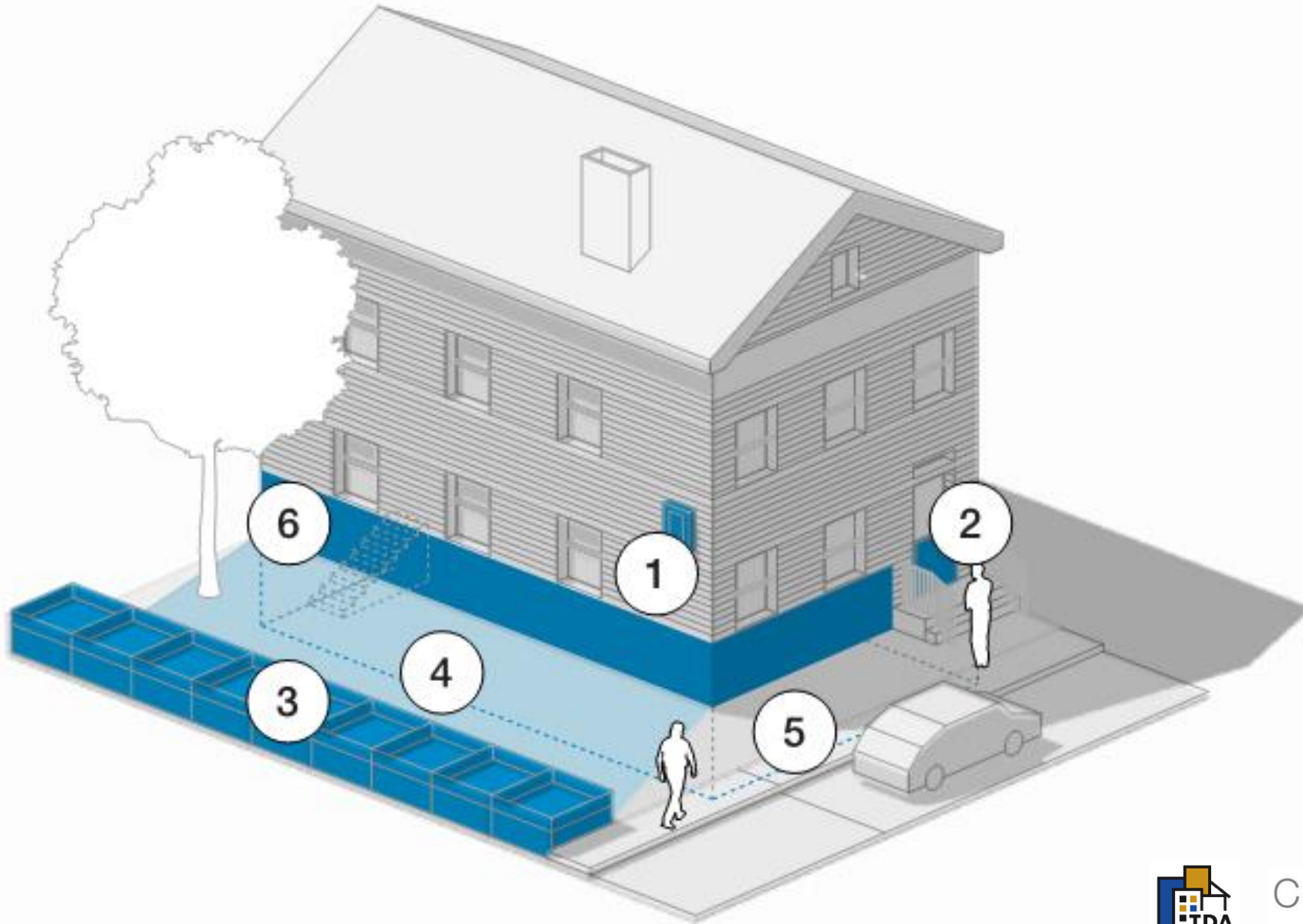


- ① COMMUNICATION CENTER
- ② IMPERMEABLE WALLS
- ③ FLOOR SHIELDS
- ④ ENERGY SUPPLY
- ⑤ PROVISIONS & STORAGE
- ⑥ EMERGENCY BARRIERS
- ⑦ GREEN INFRASTRUCTURE

Solution #2: Mystic Wastewater Treatment Facility

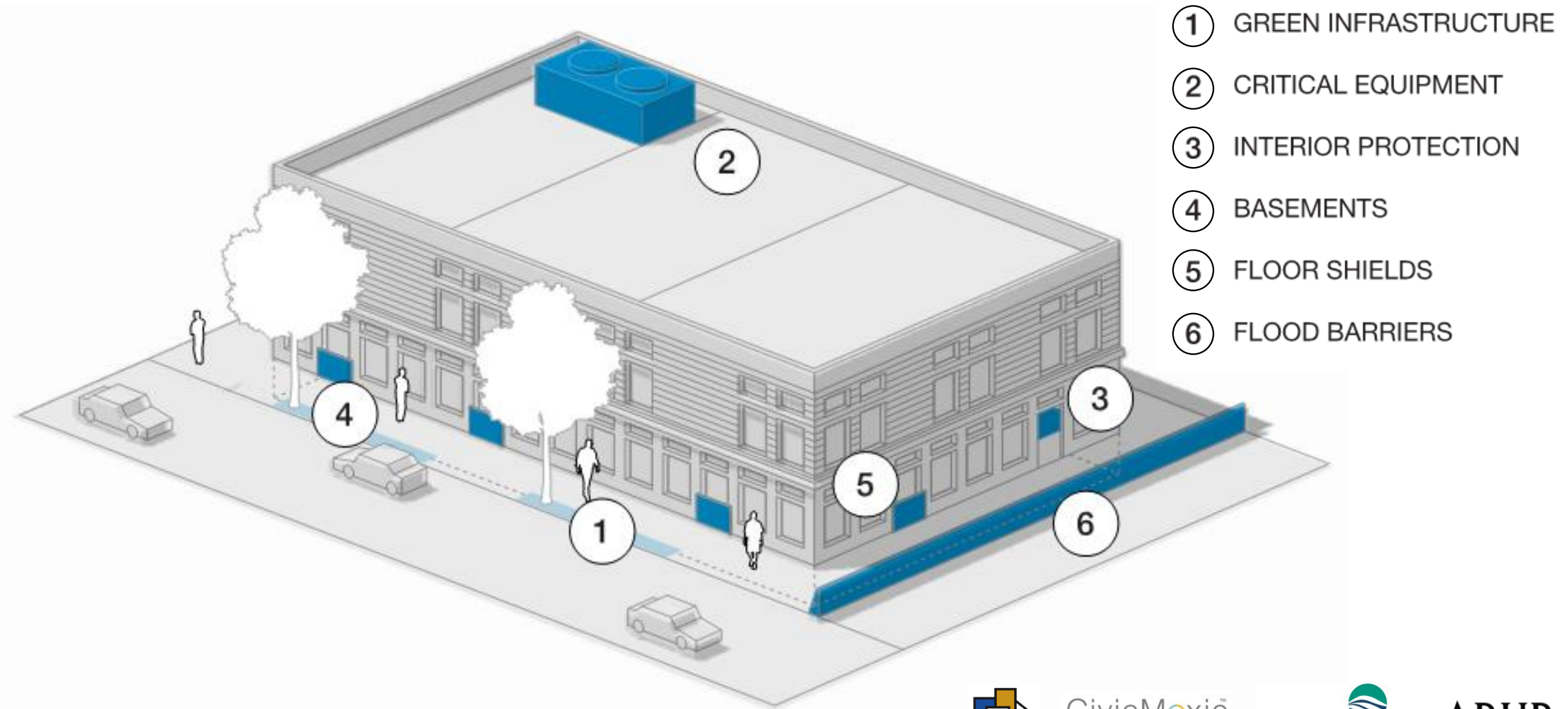


Solution 3(a): Typical Single-Family Home

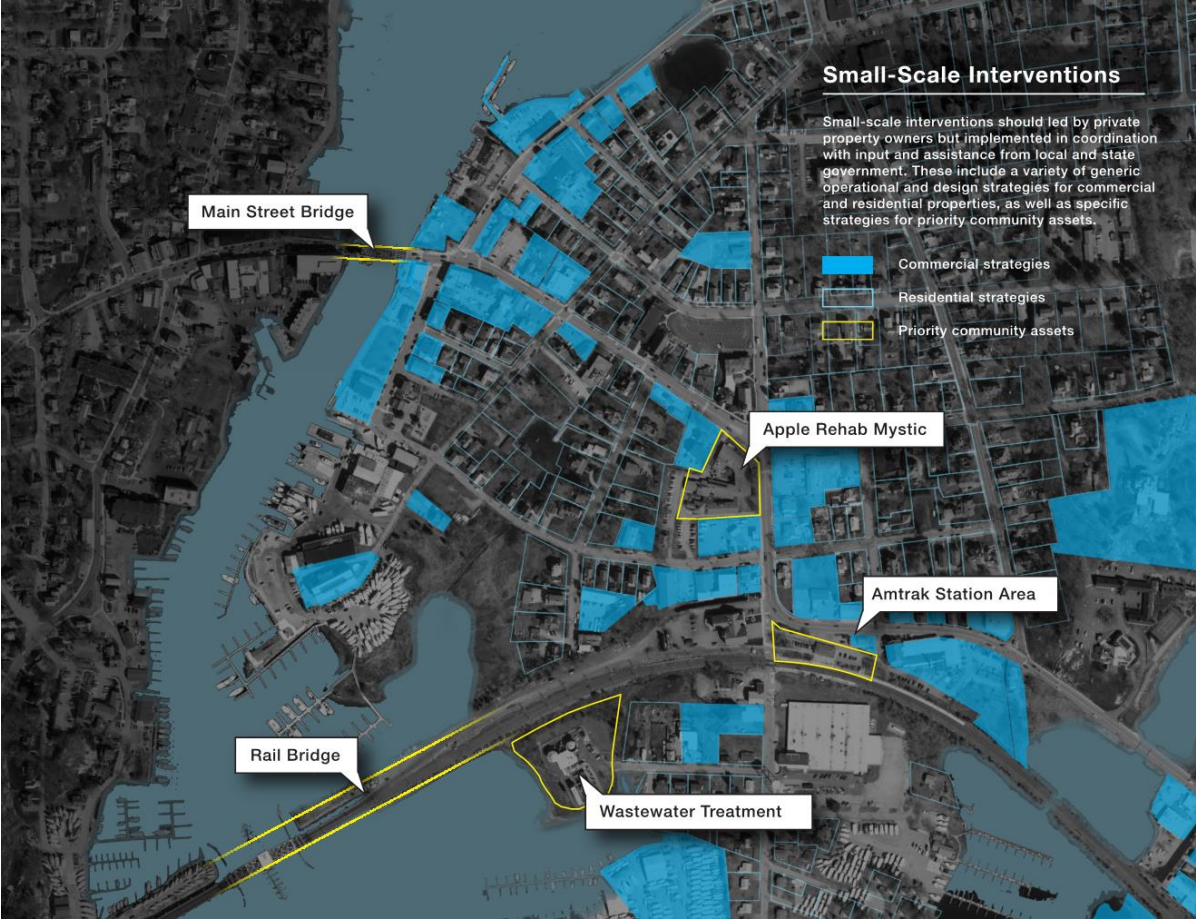


- ① ELECTRICAL WIRING
- ② FLOOR SHIELDS
- ③ EMERGENCY BARRIERS
- ④ LANDSCAPING
- ⑤ IMPERMEABLE WALLS
- ⑥ BASEMENT

Solution #3(b): Typical Mixed-Use Building



Solution #4: Mystic Neighborhood



Solution #5: Masons Island Causeway



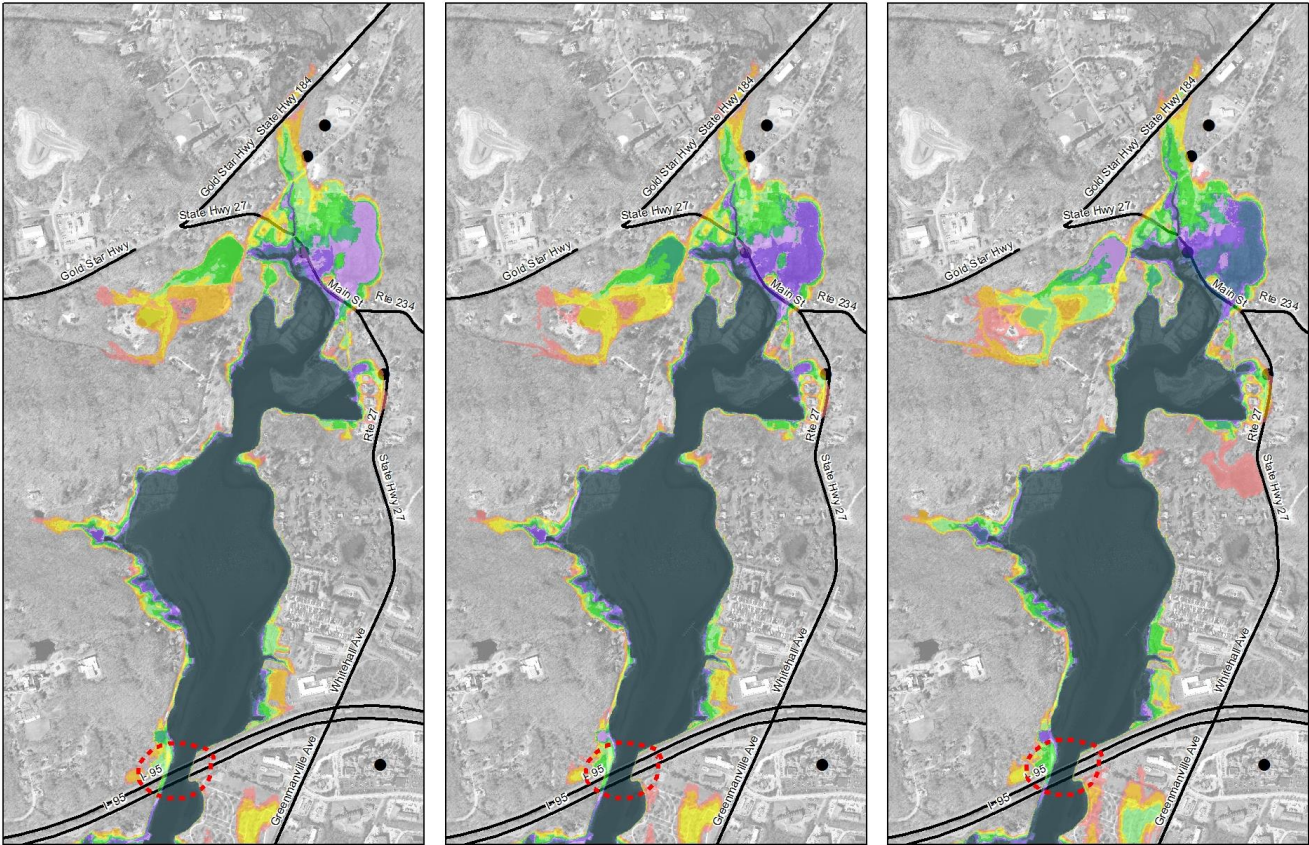
GREEN INFRASTRUCTURE

ROAD ELEVATION

SHORELINE TREATMENT

RISING GATE

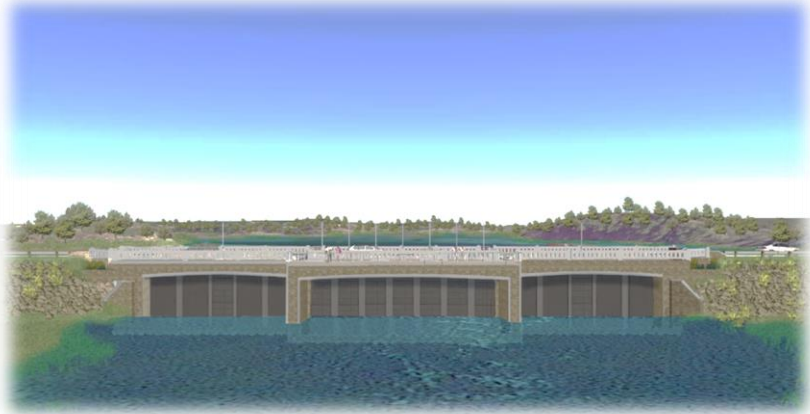
I-95 Regional Adaptation Option



Present

2030

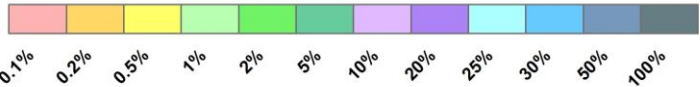
2050



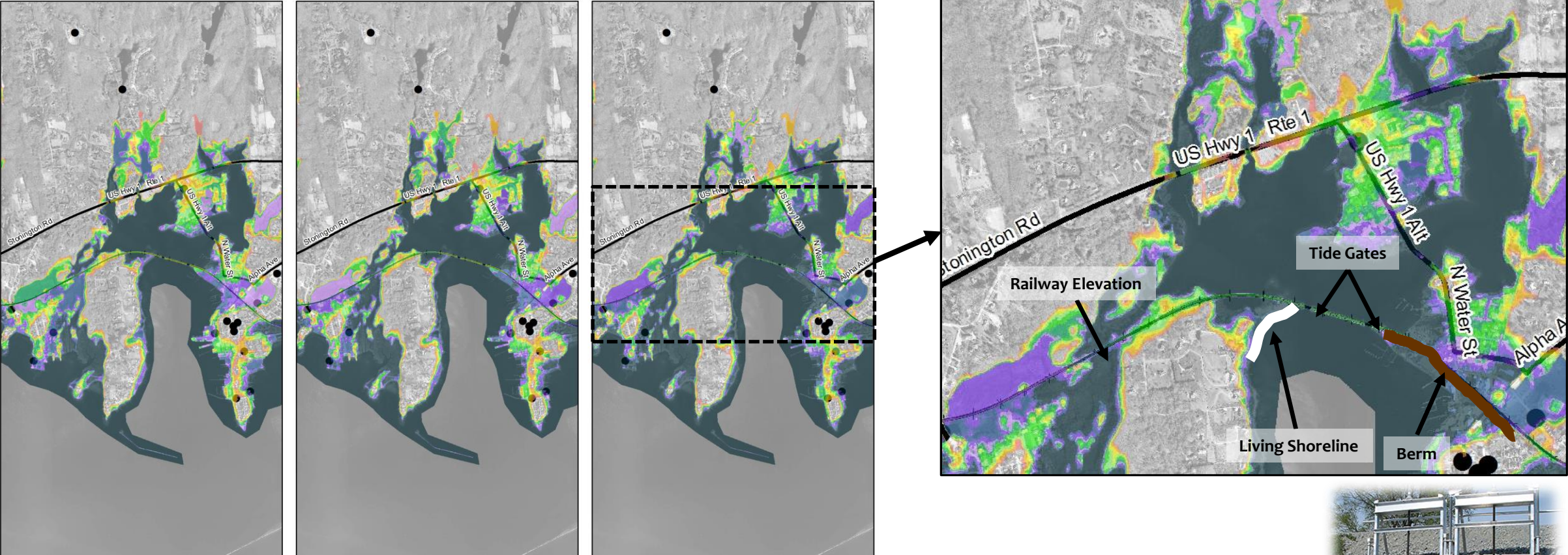
Herring River Restoration Project, Wellfleet, MA



Stonington Inundation Probability



Stonington Borough Regional Adaptation Option



0 500 1000 2000 Meters



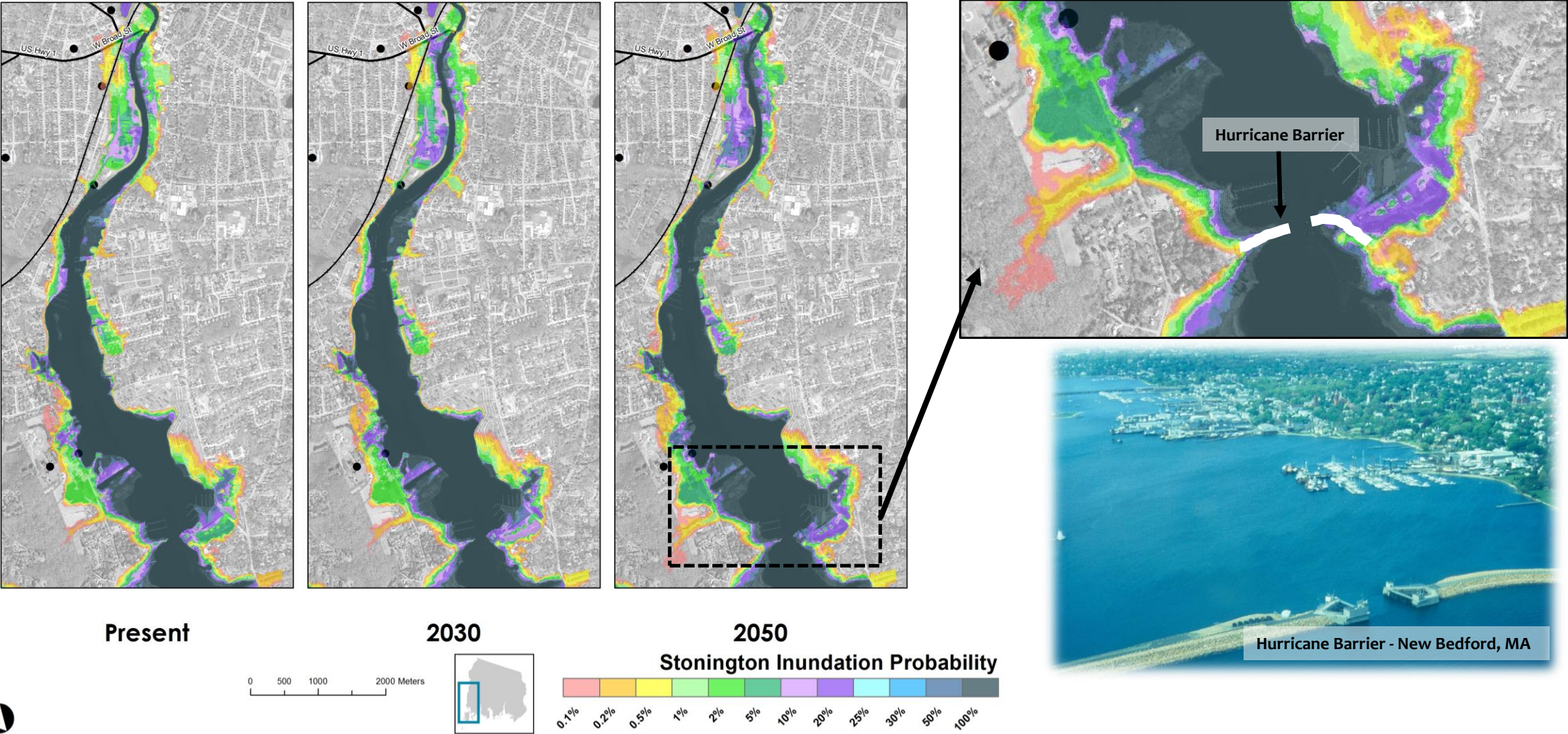
Stonington Inundation Probability



Tide Gates



Pawcatuck River Regional Adaptation Option



0 500 1000 2000 Meters

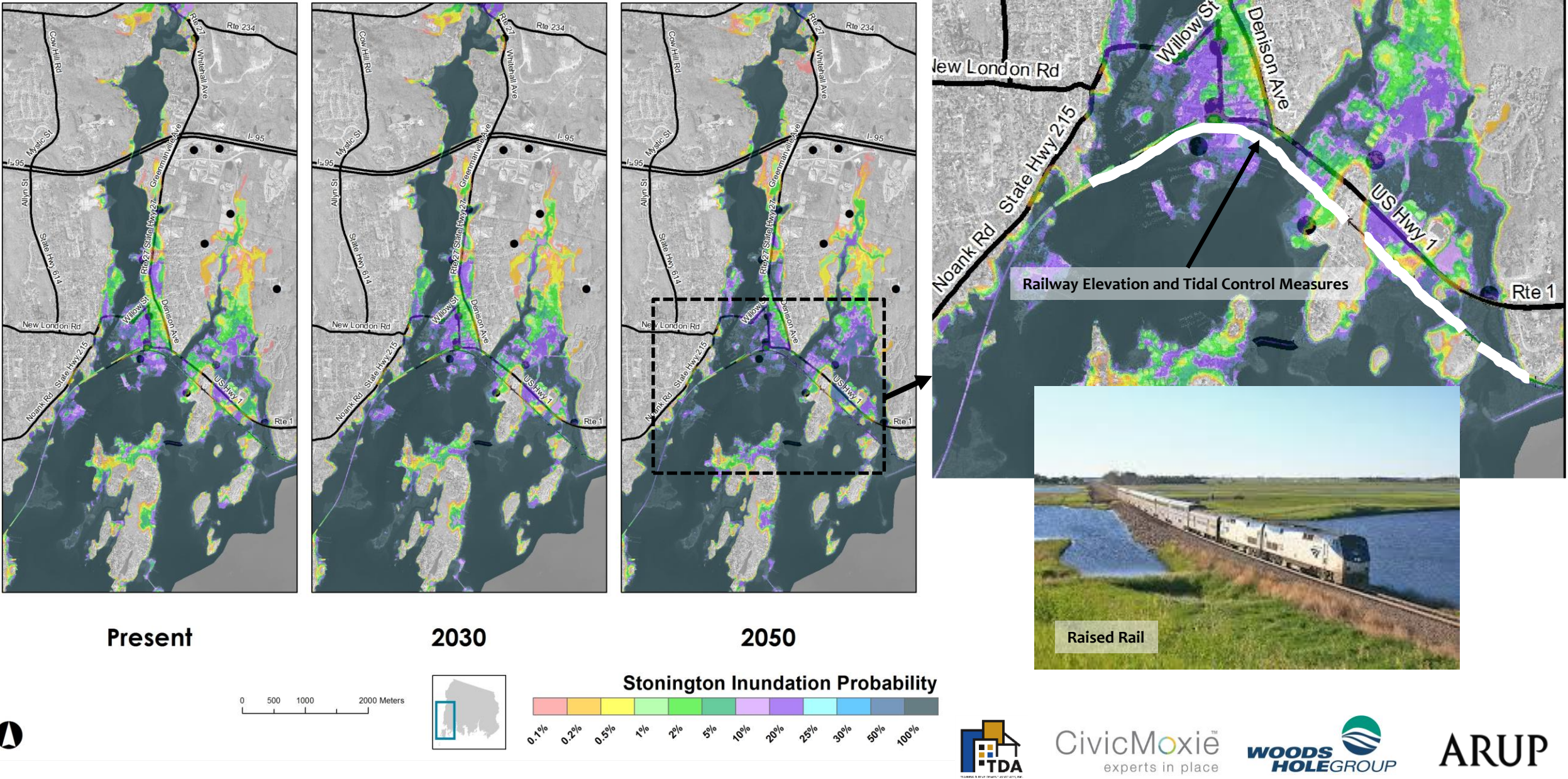


CivicMoxie™
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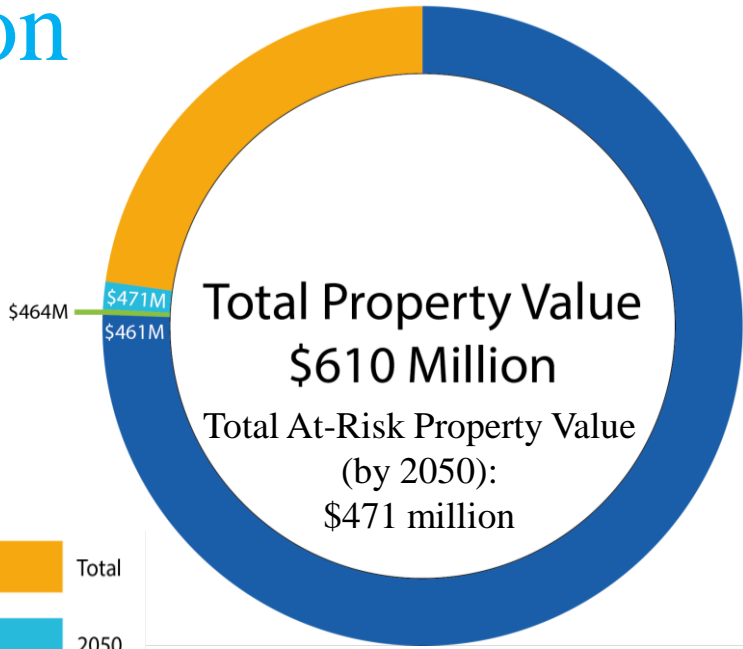
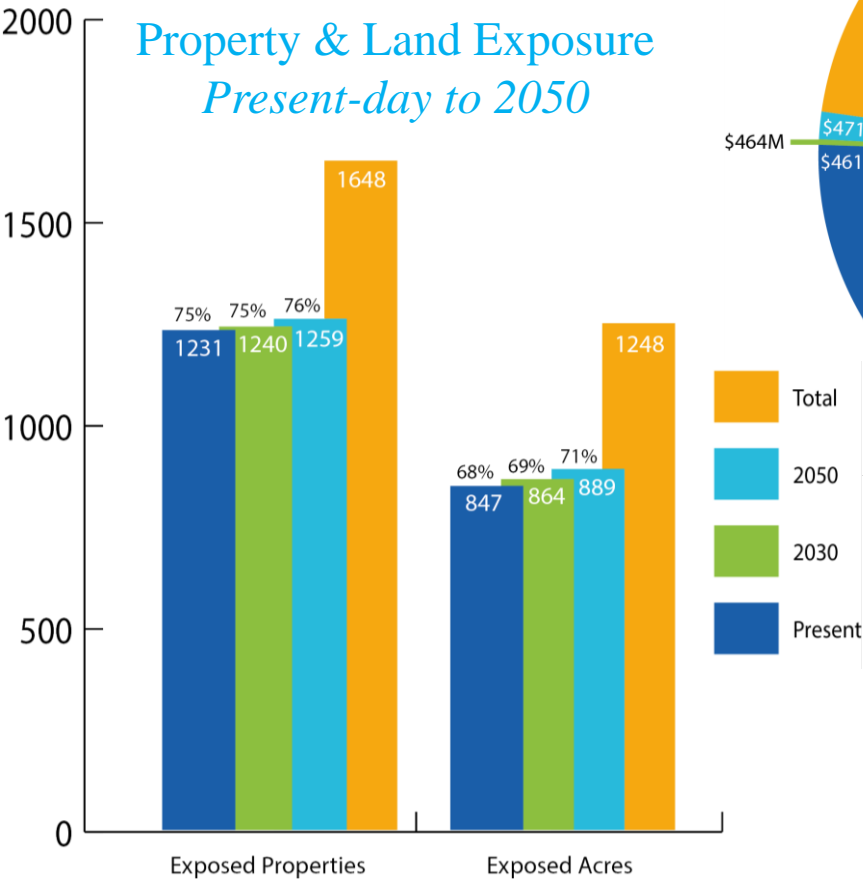
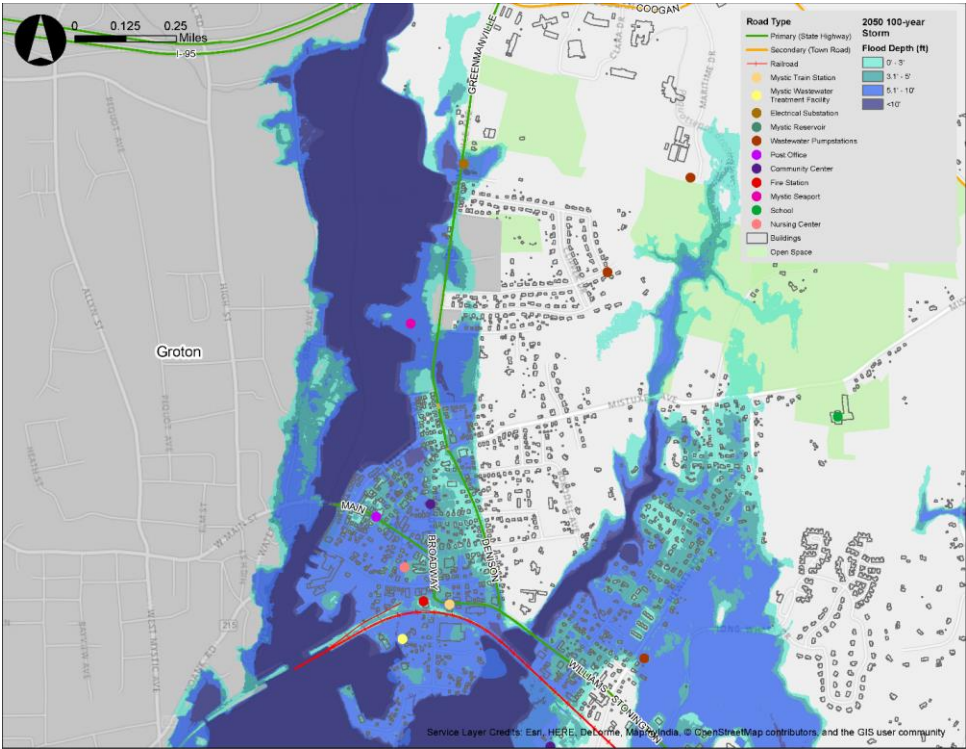
Mystic Regional Adaptation Option



Key Priorities & Next Steps



Cost/Benefit Analysis for Mystic Adaptation



Disclaimer: These are very high level estimates and should only be used to understand the potential order of magnitude of these costs. They should be not be used for any detailed planning work or design and engineering studies.

Cost/Benefit Analysis for Mystic Adaptation



Adaptation Costs: > \$100 million

Acres of Land Protected from Inundation:

- Present: 706 acres of inundation
- 2030: 734 acres of inundation
- 2050: 795 acres of inundation

Approximate Value of Property Protected:

- Present: \$461 million
- 2030: \$464 million
- 2050: \$471 million

Disclaimer: These are very high level estimates and should only be used to understand the potential order of magnitude of these costs. They should be not be used for any detailed planning work or design and engineering studies.

Cost of Inaction	Original Source
\$1 invested in building resilience saves \$4 in disaster response and recovery	National Institute of Building Sciences FEMA
\$1 invested in resilience saves: <ul style="list-style-type: none"> • \$4-7 in response • \$5-10 in avoided economic losses 	The World Bank
\$1 invest in disaster preparedness saves \$7-10 on response	Catholic Relief Services
\$1 invested in preparedness is worth \$15 in disaster relief efforts	Stanford Business School

Details of a Cost/Benefit Analysis

Economic impacts:

- Direct, physical impacts
- Business continuity and cascading regional impacts
- Lost opportunities
- Could impact creditworthiness and insurability

Social impacts:

- Costs associated with not being able to access critical services
- Job loss, public health impacts, decrease in quality of life
- Recurrent challenges borne by those most vulnerable
- Public safety concerns

Environmental considerations:

- Degradation of the natural environment and associated ecosystems

Funding Opportunities

1. Town Budget

- Incorporate a line item for resilience into the annual budget
- Tax Increment Financing Districts (TIFs) can help fund infrastructure and resilience improvements.

2. Loans & Bonds

- Pursue low interest loans to finance large-scale resilient infrastructure strategies
 - Shore Up CT offers up to \$300,000 for property owners in flood zones to retrofit their properties
- Resilience Bonds are an emerging resource that modify traditional catastrophe bonds to provide insurance savings that can be captured as rebates to invest in resilient infrastructure

3. Grants

- Many public, private and non-profit entities offer grants to encourage coastal flood adaptation efforts.
 - CT Institute of Resiliency & Climate Adaptation (CIRCA) provides funding to municipalities for resilience

4. Private Funding

- Public-Private Partnerships (P3) allow for cost-sharing between the Town and private entities that also need to protect their assets from flood impacts
 - DC Water Century Green Bond is an example of one type of partnership between a public and private entity

Current Trends in Resilient Financing

Past:

- Major source of resilience funding came from federal agencies, such as FEMA, Department of Housing and Urban Development (HUD), Coastal Zone Management (CZM), Environmental Protection Agency (EPA)

Future Trends:

- Push for cities and states to take on more responsibility for resilience
 - FEMA's Disaster Deductible
 - Insurance
- Growing interest from private equity to invest in resilience
 - This will require investment-grade performance metrics for resilience in order to capture the benefits of investing in resilience projects

Short-Term Priorities (1-2 years)

1. Continue to hold community events and educate the public on coastal flood risks

- Ensuring that the community understands the risks and the ways to mitigate flood risk on their properties is essential for a community to be resilient
- Neighborhoods with strong community ties are more resilient in the event of a disaster because they have a support system in place

2. Propose resilience amendments to Stonington's zoning and building codes

- Amendments to the zoning and building codes will ensure that any future development or major property renovations are required to build resiliently

3. Incorporate resilience as a line item in the town budget

4. Leverage current projects to implement resilience solutions

5. Renew participation in the Community Rating System (CRS) and upgrade status

- FEMA's CRS program allows for communities to reduce flood insurance rates by implementing resilience solutions

6. Pursue grants and match funding for implementing resilient solutions

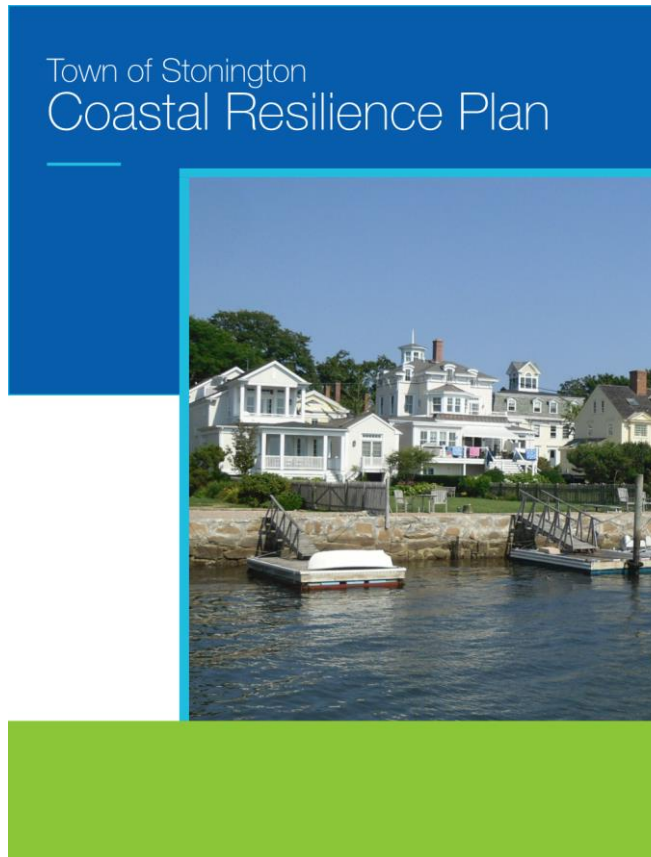


Long-Term Priorities (5 years)

1. Continue to educate the public and pursue funding opportunities (these should be on-going efforts)
2. Form partnerships with:
 - Neighboring communities and like-minded communities
 - Key stakeholders in Stonington, including business owners
 - Historic commissions
 - Important local, state, and federal government entities
3. Conduct a feasibility analysis for regional adaptation solutions, starting with the Mystic Regional Adaptation
4. Perform a stormwater modeling analysis to get a complete understanding of the Town's flood risk

What You Can Do

1. Stay engaged!
2. Understand your flood risk and the adaptation strategies that you can implement on your own property
3. Educate your neighbors
4. Invite the Town to speak about coastal resilience
5. Recognize opportunities to collaborate with stakeholders on resilience solutions



The Town of Stonington Coastal Resilience Plan
will be available in August 2017.